translation of the front page of the Laid-opened Application No. 10-326480

(19) JAPANESE PATENT OFFICE

(12) Patent Laid-Open Publication (A)

(11) Laid-opened Application No. 10-326480

(43) Laid-opened on: December 8, 1998

(51) Int. Cl.[6] G11B 27/031
H04N 5/76
5/765

(54) Title of the Invention: VIDEO SIGNAL RECORDING APPARATUS AND VIDEO SIGNAL RECORDING METHOD

(21) Application No. 9-135613

(21) Date of filing: May 26, 1997

(71) Assignee: 000002185
Sony Kabushiki Kaisha

(72) Inventors: Naohisa Arai et al.

(74) Agent: Patent Attorney, Akira Koike

[Title of the Invention] VIDEO SIGNAL RECORDING APPARATUS AND VIDEO SIGNAL RECORDING METHOD

[Abstract]

[Problem] When a broadcast video signal is recorded on a recording medium, an intermittent image by which an outline of the recorded contents can be understood is generated.

[Solving Means] A video signal recording apparatus 1 records an input video signal on a recording medium 15. An additional information detecting circuit 16 detects additional information contained in, e.g., a subcode and vertical blanking period of the input video signal. A feature amount detecting circuit 17 detects a feature amount indicating, e.g., the moving amount of the video signal and the existence of a telop. A thinning circuit 18 thins the input video signal by a predetermined amount and records the thinned signal on the recording medium 15, on the basis of the control of a system controller 20. The system controller 20 obtains a representative frame corresponding to the additional information and feature amount described above, and causes the thinning circuit 18 to record this representative frame.

[What Is Claimed Is]

[Claim 1] A video signal recording apparatus comprising:

detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image;

additional information reproducing means for reproducing additional information of the broadcast video signal;

control means for controlling the intermittence interval of a representative frame to be detected by said detecting means in accordance with the additional information; and

recording means for recording the representative frame on a recording medium.

[Claim 2] The video signal recording apparatus according to claim 1, characterized in that said recording means records a video signal of the representative frame on a recording medium together with a broadcast video signal.

[Claim 3] The video signal recording apparatus according to claim 1, characterized by further comprising identification signal generating means for generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein said recording means adds the identification signal to a broadcast video signal and records this video signal on a recording medium.

[Claim 4] The video signal recording apparatus according to claim 1, characterized in that said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with contents of a broadcast video signal.

[Claim 5] The video signal recording apparatus according to claim 1, characterized in that said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with a broadcasting time of a broadcast video signal.

[Claim 6] The video signal recording apparatus according to claim 1, characterized in that said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with a supply source of a broadcast video signal.

[Claim 7] A video signal recording apparatus comprising:

detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image;

a feature amount detecting means for detecting a feature amount of the broadcast video signal;

control means for controlling an intermittence

interval of a representative frame to be detected by said detecting means in accordance with the feature amount; and

recording means for recording the representative frame on a recording medium.

[Claim 8] The video signal recording apparatus according to claim 7, characterized in that said recording means records a video signal of the representative frame on a recording medium together with a broadcast video signal.

[Claim 9] The video signal recording apparatus according to claim 7, characterized by further comprising identification signal generating means for generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein said recording means adds the identification signal to a broadcast video signal and records this video signal on a recording medium.

[Claim 10] The video signal recording apparatus according to claim 7, characterized in that

said feature amount detecting means detects a moving amount of a broadcast video signal, and

said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with the moving amount.

[Claim 11] The video signal recording apparatus according to claim 7, characterized in that

said feature amount detecting means detects a telop signal of a broadcast video signal, and

said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with the telop signal.

[Claim 12] The video signal recording apparatus according to claim 7, characterized in that

said feature amount detecting means detects a scene changing point of a broadcast video signal, and

said control means controls the intermittence interval of a representative frame to be detected by said detecting means, in accordance with the scene changing point.

[Claim 13] A video signal recording apparatus comprising:

detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image;

additional information reproducing means for reproducing additional information of the broadcast video signal;

feature amount detecting means for detecting a feature amount of the broadcast video signal;

control means for controlling an intermittence interval of a representative frame to be detected by said detecting means, in accordance with the additional information and the feature amount; and

recording means for recording the representative frame on a recording medium.

[Claim 14] The video signal recording apparatus according to claim 13, characterized in that said recording means records a video signal of the representative frame on a recording medium together with a broadcast video signal.

[Claim 15] The video signal recording apparatus according to claim 13, characterized by further comprising identification signal generating means for generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein said recording means adds the identification signal to a broadcast video signal and records this video signal on a recording medium.

[Claim 16] A video signal recording method characterized by comprising:

reproducing a moving image from a broadcast video signal;

reproducing additional information of the broadcast video signal;

changing an intermittence interval of a

representative frame to be detected in accordance with the additional information, and intermittently detecting a representative frame from the reproduced moving image; and

recording the representative frame on a recording medium.

[Claim 17] The video signal recording method according to claim 16, characterized in that a video signal of the representative frame is recorded on a recording medium together with a broadcast video signal.

[Claim 18] The video signal recording method according to claim 16, characterized by further comprising generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein the identification signal is added to a broadcast video signal, and the video signal with the identification signal is recorded on a recording medium.

[Claim 19] The video signal recording method according to claim 16, characterized in that the intermittence interval of a representative frame to be detected is changed in accordance with contents of a broadcast video signal.

[Claim 20] The video signal recording method according to claim 16, characterized in that the intermittence interval of a representative frame to be detected is changed in accordance with a broadcasting

time of a broadcast video signal.

[Claim 21] The video signal recording method according to claim 16, characterized in that the intermittence interval of a representative frame to be detected is changed in accordance with a supply source of a broadcast video signal.

[Claim 22] A video signal recording method characterized by comprising:

reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image;

detecting a feature amount of the broadcast video signal;

changing an intermittence interval of a representative frame to be detected in accordance with the feature amount; and

recording the representative frame on a recording medium.

[Claim 23] The video signal recording method according to claim 22, characterized in that a video signal of the representative frame is recorded on a recording medium along with a broadcast video signal.

[Claim 24] The video signal recording method according to claim 22, characterized by further comprising generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein the identification signal is added to a broadcast video signal, and the video signal with the identification signal is recorded on a recording medium.

[Claim 25] The video signal recording method according to claim 22, characterized in that

a moving amount of a broadcast video signal is detected, and

the intermittence interval of a representative frame to be detected is changed in accordance with the moving amount.

[Claim 26] The video signal recording method according to claim 22, characterized in that

a telop signal of a broadcast video signal is detected, and

the intermittence interval of a representative frame to be detected is changed in accordance with the telop signal.

[Claim 27] The video signal recording method according to claim 22, characterized in that

a scene changing point of a broadcast video signal is detected, and

the intermittence interval of a representative frame to be detected is changed in accordance with the scene changing point.

[Claim 28] A video signal recording method characterized by comprising:

reproducing a moving image from a broadcast video

signal;

reproducing additional information of the broadcast video signal;

detecting a feature amount of the broadcast video signal;

changing an intermittence interval of a representative frame to be detected in accordance with the additional information and the feature amount, and intermittently detecting a representative frame from the reproduced moving image; and

recording the representative frame on a recording medium.

[Claim 29] The video signal recording method according to claim 28, characterized in that a video signal of the representative frame is recorded on a recording medium together with a broadcast video signal.

[Claim 30] The video signal recording method according to claim 28, characterized by further comprising generating an identification signal indicating that portion of a broadcast video signal, which contains a representative frame,

wherein the identification signal is added to a broadcast video signal, and the video signal with the identification signal is recorded on a recording medium.

[Detailed Description of the Invention]

[0001]

[Technical Field to Which the Invention

Belongs]

The present invention relates to a video signal recording apparatus and video signal recording method of recording video signals of, e.g., television broadcasting and digital satellite broadcasting and, more particularly, to a video signal recording apparatus and video signal recording method of recording an intermittent image by which an outline of the contents of a video signal to be recorded is understood.

[0002]

[Prior Art]

Recently, the storage capacity of a recording medium, such as an optical disk, hard disk, or digital video tape, for recording video signals of television broadcasting and digital satellite broadcasting ranges from several megabytes to several ten gigabytes, i.e., the storage capacity is more and more increasing. Accordingly, this large-capacity recording medium can continuously record television broadcasting and the like for several hours to several ten hours.

[0003]

[Problem That the Invention Is to Solve]

When this recording medium is used to record television broadcasting and the like, however, a user cannot check all the contents within a short time period, even if the recorded contents are rapidly reproduced, because the recording capacity is very large. Therefore,

recording television broadcasting and the like by using this large-capacity recording medium requires a function capable of checking an outline of the recorded contents, information of the recorded position of each program, and the like.

[0004]

Unfortunately, it is conventionally very difficult to check an outline of the contents of a video signal recorded on a recording medium. For example, to check an outline of the contents recorded on a recording medium, interval reproduction which omits reproduction points at fixed time intervals is usable. However, this interval reproduction reproduces the recorded video signal regardless of the recorded contents, so the reproduced contents are difficult to understand.

[0005]

The present invention has been made in consideration of the above situation, and has as its object to provide a video signal recording apparatus and video signal recording method which, when recording a broadcast video signal on a recording medium, generate an intermittent image by which an outline of the recorded contents can be understood.

[0006]

[Means of Solving the Problems]

To solve the above problem, a video signal recording apparatus according to the present invention

comprises detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image, additional information reproducing means for reproducing additional information of the broadcast video signal, control means for controlling the intermittence interval of a representative frame to be detected by the detecting means in accordance with the additional information, and recording means for recording the representative frame on a recording medium.

[0007]

This video signal recording apparatus detects a representative frame in accordance with additional information and records an intermittent video signal.

[0008]

A video signal recording apparatus according to the present invention comprises detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image, a feature amount detecting means for detecting feature amount of the broadcast video signal, control means for controlling an intermittence interval of a representative frame to be detected by the detecting means in accordance with the feature amount, and recording means for recording the representative frame on a recording medium.

[0009]

This video signal recording apparatus detects a representative frame in accordance with a feature amount and records an intermittent video signal.

[0010]

A video signal recording apparatus according to the present invention comprises detecting means for reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image, additional information reproducing means for reproducing additional information of the broadcast video signal, feature amount detecting means for detecting a feature amount of the broadcast video signal, control means for controlling an intermittence interval of a representative frame to be detected by the detecting means, in accordance with the additional information and the feature amount, and recording means for recording the representative frame on a recording medium.

[0011]

This video signal recording apparatus detects a representative frame in accordance with additional information and a feature amount and records an intermittent video signal.

[0012]

A video signal recording method according to the present invention is characterized by comprising reproducing a moving image from a broadcast video signal,

reproducing additional information of the broadcast video signal, changing an intermittence interval of a representative frame to be detected in accordance with the additional information, and intermittently detecting a representative frame from the reproduced moving image, and recording the representative frame on a recording medium.

[0013]

This video signal recording method detects a representative frame in accordance with additional information and records an intermittent video signal.

[0014]

A video signal recording method according to the present invention is characterized by comprising reproducing a moving image from a broadcast video signal and intermittently detecting a representative frame from the reproduced moving image, detecting a feature amount of the broadcast video signal, changing an intermittence interval of a representative frame to be detected in accordance with the feature amount, and recording the representative frame on a recording medium.

[0015]

This video signal recording method detects a representative frame in accordance with a feature amount and records an intermittent video signal.

[0016]

A video signal recording method according to the

present invention is characterized by comprising reproducing a moving image from a broadcast video signal, reproducing additional information of the broadcast video signal, detecting a feature amount of the broadcast video signal, changing an intermittence interval of a representative frame to be detected in accordance with the additional information and the feature amount, and intermittently detecting a representative frame from the reproduced moving image, and recording the representative frame on a recording medium.

[0017]

This video signal recording method detects a representative frame in accordance with additional information and a feature amount and records an intermittent video signal.

[0018]

[Embodiment].

A video signal recording apparatus as an embodiment of the present invention will be described below with reference to the accompanying drawings. The video signal recording apparatus of this embodiment is an apparatus which records a broadcast or transmitted video signal on a recording medium, detects a representative frame of the video signal, and generates an intermittent image by thinning the video signal except for the representative frame.

[0019]

Fig. 1 is a block diagram of the video signal recording apparatus of the embodiment of the present invention.

[0020]

A video signal recording apparatus 1 includes a video signal input circuit 2 for receiving an analog video signal broadcast or transmitted through wire, a camera signal input circuit 3 for receiving a transmission signal from a camera, a digital video signal input circuit 4 for receiving a broadcast or transmitted digital video signal, a received signal input circuit 5 for receiving a radio broadcast video signal and audio signal, a video signal switching circuit 6 for switching input video signals from the video signal input circuit 2, the camera signal input circuit 3, the digital video signal input circuit 4, and the received signal input circuit 5, and a video signal compressing circuit 7 for compressing an input video signal.

[0021]

This video signal recording apparatus 1 also includes an audio signal input circuit 8 for receiving an analog audio signal broadcast or transmitted through wire, a microphone signal input circuit 9 for receiving a transmission signal from a microphone, a digital audio signal input circuit 10 for receiving a broadcast or

transmitted digital audio signal, an audio signal switching circuit 11 for switching input audio signals from the audio signal input circuit 8, the microphone signal input circuit 9, the digital audio signal input circuit 10, and the received signal input circuit 5, an audio signal detecting circuit 12 for detecting an audio signal, and an audio signal compressing circuit 13 for compressing an input audio signal.

[0022]

The video signal recording apparatus 1 further includes a recording circuit 14 which synthesizes a video signal compressed by the video signal compressing circuit 7 and an audio signal compressed by the audio signal compressing circuit 13, and records the synthetic signal on a recording medium 15.

[0023]

In addition, the video signal recording apparatus 1 includes an additional information detecting circuit 16 for detecting additional information of a broadcast or transmitted video signal, or additional information superposed on or attached to each video signal, a feature amount detecting circuit 17 for detecting the feature amount of a video signal, and a thinning circuit 18 for detecting a representative frame and thinning a video signal except for the representative frame.

[0024]

Furthermore, the video signal recording apparatus

1 includes a system controller 20 for controlling the thinning circuit 18 on the basis of additional information and a feature amount, and also controlling other circuits, a database 21 storing data which this system controller 20 refers to, and a manipulation input circuit 22 for supplying manipulation inputting information to the system controller 20.

[0025]

The video signal input circuit 2 receives, e.g., an analog video signal broadcast or transmitted through wire. The video signal input circuit 2 converts this analog video signal into a baseband video signal by demodulation or the like, converts the baseband video signal into a digital video signal, and supplies the digital video signal to the image signal switching circuit 6.

[0026]

The camera signal input circuit 3 receives, e.g., a video signal obtained by a video camera. If this video signal from a video camera is an analog signal, the camera signal input circuit 3 converts the video signal into a baseband video signal by demodulation or the like, converts this baseband video signal into a digital video signal, and supplies the signal to the video signal switching circuit 6. If the video signal from a video camera is a digital signal, the camera signal input circuit 3 performs decoding processes such as error

correction and expansion of the compressed signal, and supplies the signal to the video signal switching circuit 6.

[0027]

The digital video signal input circuit 4 receives, e.g., a video signal supplied by digital transmission or digital broadcasting. This digital video signal input circuit 4 converts the input video signal into baseband digital data by processing such as demodulation, performs error correction, expansion of the compressed signal, and the like, and supplies the signal to the video signal switching circuit 6.

[0028]

A radio broadcast video signal and audio signal received by an antenna or the like are input to the received signal input circuit 5. This received signal input circuit 5 converts the received video signal into a baseband video signal by processing such as demodulation, converts this baseband video signal into a digital video signal, and supplies the signal to the video signal switching circuit 6. If the video signal is a digital signal, the received signal input circuit 5 performs decoding processes such as error correction and expansion of the compressed data, and supplies the signal to the video signal switching circuit 6. Also, the received signal input circuit 5 converts the received audio signal into a baseband audio signal by

processing such as demodulation, converts this baseband audio signal into a digital audio signal, and supplies the signal to the audio signal switching circuit 11. If the audio signal is a digital signal, the received signal input circuit 5 performs decoding processes such as error correction and expansion of the compressed data, and supplies the signal to the audio signal switching circuit 11.

[0029]

The video signal switching circuit 6 receives the digital video signals from the video signal input circuit 2, the camera signal input circuit 3, the digital video signal input circuit 4, and the received signal input circuit 5. Each input signal is a digital video signal of, e.g., a color difference signal. On the basis of the control of the system controller 20, the video signal switching circuit 6 selects one of the input video signals and supplies the selected signal to the video signal compressing circuit 7, the additional information detecting circuit 16, the feature amount detecting circuit 17, and the thinning circuit 18.

[0030]

The video signal compressing circuit 7 receives the digital video signal from the video signal switching circuit 6 and an intermittent video signal from the thinning circuit 18 to be described later. This video signal compressing circuit 7 compresses one or both of

the digital video signal from the video signal switching circuit 6 and the intermittent digital video signal from the thinning circuit 18 to be described later by, e.g., MPEG2 (Moving Picture Experts Group 2), and supplies the compressed signal to the recording circuit 14. The audio signal input circuit 8 receives, e.g., an analog audio signal broadcast or transmitted through wire. The audio signal input circuit 8 converts this analog audio signal into a baseband audio signal by demodulation or the like, converts this baseband audio signal into a digital audio signal, and supplies the signal to the audio signal switching circuit 11.

[0031]

The microphone signal input circuit 9 receives, e.g., an audio signal detected by a microphone. If the audio signal from a microphone is an analog signal, the microphone signal input circuit 9 converts the analog signal into a baseband audio signal by demodulation or the like, converts this baseband audio signal into a digital audio signal, and supplies the signal to the audio signal switching circuit 11. If the audio signal from a microphone is a digital signal, the microphone signal input circuit 9 performs decoding processes such as error correction and expansion of the compressed signal, and supplies the signal to the audio signal switching circuit 11.

[0032]

The digital audio signal input circuit 10 receives, e.g., an audio signal supplied by digital transmission or digital broadcasting. This digital audio signal input circuit 10 converts the input audio signal into baseband digital data by processing such as demodulation, performs error correction, expansion of the compressed signal, and the like, and supplies the signal to the audio signal switching circuit 11.

[0033]

The audio signal switching circuit 11 receives the digital audio signals from the audio signal input circuit 8, the microphone signal input circuit 9, the digital audio signal input circuit 10, and the received signal input circuit 5. On the basis of the control of the system controller 20, the audio signal switching circuit 11 selects one of the input audio signals and supplies the selected signal to the audio signal detecting circuit 12.

[0034]

The digital audio signal from the audio signal switching circuit 11 is input to the audio signal detecting circuit 12. On the basis of the control of the system controller 20, the audio signal detecting circuit 12 detects an audio signal corresponding to an intermittent video signal obtained by thinning the video signal by the thinning circuit 18 to be described later, and supplies this audio signal to the audio signal

compressing circuit 13. Alternatively, the audio signal detecting circuit 12 supplies to the audio signal compressing circuit 13 the audio signal corresponding to the intermittent video signal obtained by thinning the video signal by the thinning circuit 18, together with the input digital audio signal.

[0035]

The digital audio signal from the audio signal detecting circuit 12 is input to the audio signal compressing circuit 13. This audio signal compressing circuit 13 compresses the digital audio signal from the audio signal switching circuit 11 by, e.g., MPEG2, and supplies the compressed signal to the recording circuit 14. The recording circuit 14 receives the digital video signal from the video signal compressing circuit 7 and the digital audio signal from the audio signal compressing circuit 13. The recording circuit 14 synthesizes these digital video signal and digital audio signal by a predetermined format, i.e., in accordance with the recording format of the recording medium 15. Also, the recording circuit 14 generates, e.g., file management information so-called FAT (File Allocation Table), TOC (Table Of Contents), and subcode in accordance with a recording medium to be used, and synthesizes these pieces of file management information together with the digital video signal and digital audio signal. Note that these pieces of file management

information can also be generated by the system controller 20 and synthesized with the video signal and the like and recorded by the recording circuit 14. The recording circuit 14 modulates the video signal and the like to be recorded by a predetermined scheme, performs processing such as addition of error correction codes, and records the data on the recording medium 15.

[0036]

This recording medium 15 can be a recording medium such as a hard disk, magnetic disk, magnetooptical disk, or memory card.

[0037]

The digital video signal from the video signal switching circuit 6 is input to the additional information detecting circuit 16. This additional information detecting circuit 16 also receives additional information supplied together with each input video signal, i.e., the received signal from the antenna, the analog video signal, the camera signal, or the digital video signal. The additional information detecting circuit 16 detects information other than image data of the digital video signal, e.g., information inserted into a vertical blanking period or the like, pilot information, or additional information contained in a header portion of the digital video signal. The additional information detecting circuit 16 also detects additional information supplied together

with each input video signal. The contents of this additional information will be described in detail later.

[0038]

The digital video signal from the video signal switching circuit 6 is input to the feature amount detecting circuit 17. This feature amount detecting circuit 17 detects, e.g., a moving amount or telop from the video signal, and outputs the detected moving amount or telop as a feature amount. The feature amount detecting circuit 17 supplies the detected feature amount to the system controller 20. Details of this moving amount will be described later.

[0039]

The digital video signal from the video signal switching circuit 6 is input to the thinning circuit 18. This thinning circuit 18 detects a representative frame from the supplied digital signal, and generates an intermittent video signal from which an image except for this representative frame is removed. The system controller 20 controls the amount of image to be thinned by this video signal switching circuit 6, e.g., the interval of a representative frame to be detected. The thinning circuit 18 supplies the generated intermittent video signal to the video signal compressing circuit 7.

[0040]

The additional information from the additional information detecting circuit 16 and the feature amount

from the feature amount detecting circuit 17 are supplied to the system controller 20. On the basis of the input additional information and feature amount, the system controller 20 controls a representative frame to be detected by the thinning circuit 18, i.e., controls the thinning amount of the video signal.

[0041]

Also, to add a predetermined identification signal to a representative frame of the video signal to be detected by the video signal compressing circuit 7, the system controller 20 supplies an identification signal for identifying a representative frame to the recording circuit 14. The recording circuit 14 adds this identification signal to the video signal and records the signal on the recording medium 15.

[0042]

Furthermore, the system controller 20 controls switching of the video signal switching circuit 6 and the audio signal switching circuit 11. That is, the system controller 20 checks the types of input video signal and audio signal and performs this switching control. The system controller 20 also controls the audio signal detecting circuit 12. That is, the system controller 20 causes the audio signal detecting circuit 12 to detect a sound corresponding to a representative frame to be detected by the thinning circuit 18.

[0043]

Control information or the like from the database 21 is also supplied to the system controller 20. On the basis of this control information, the system controller 20 performs various control operations.

[0044]

In addition, manipulation input information from the manipulation input circuit 22 is supplied to the system controller 20. On the basis of this manipulation input information, the system controller 20 performs various control operations.

[0045]

Next, the above-mentioned representative frame detection control performed by the system controller 20 of the video signal recording apparatus 1 will be described below with reference to a flow chart and the like.

[0046]

Fig. 2 is a flow chart showing the contents of the representative frame detection control performed by the system controller 20. When the power supply or the like of the video signal recording apparatus 1 is turned on, the system controller 20 starts the process from step S1. Note that the system controller 20 advances the process in step number order unless otherwise specified. In step S1, the system controller 20 initializes circuits to be controlled.

[0047]

In step S2, the system controller 20 checks whether an operation is input from the manipulation input circuit 22. That is, the system controller 20 checks in step S2 whether to detect a representative frame and generate an intermittent image. The system controller 20 waits in step S2 until a manipulation input is made. If a manipulation input is made, the flow advances to step S3.

[0048]

In step S3, the system controller 20 loads additional information detected by the additional information detecting circuit 16. At the same time, the system controller 20 loads a feature amount detected by the feature amount detecting circuit 17. Note that if in step S5 to be described later processing not requiring additional information or a feature amount is to be performed, only one of the additional amount and the feature amount is loaded in this step S3.

[0049]

In step S4, the system controller 20 determines the contents of the process of detecting a representative frame. In this step S4, the system controller 20 selects one of a plurality of processes on the basis of the manipulation input by the user. Detailed contents of these processes will be described later.

[0050]

In step S5, the system controller 20 selects information required for the process determined in step S4, from the acquired additional information and feature amount. That is, the system controller 20 selects a specific parameter from the additional information and feature amount, and uses this parameter to determine the intermittence interval at a later time.

[0051]

In step S6, on the basis of the process contents determined in step S4 described above, the system controller 20 obtains the intermittence interval of a video signal, which is the detection interval of a representative frame, and controls the thinning circuit 18.

[0052]

In step S7, the system controller 20 generates an identification signal and supplies this identification signal to the recording circuit 4.

[0053]

In step S8, the system controller 20 checks whether the additional information or the feature amount is updated. If determining that the additional information or the feature amount is updated, the system controller 20 repeats the processing from step S3. If the system controller 20 determines that the additional information or the feature amount is not updated, the flow advances to step S9.

[0054]

In step S9, the system controller 20 checks whether recording is completed. If determining that recording is not completed, the system controller 20 repeats the processing from step S8. That is, the system controller 20 waits in these steps S8 and S9 until the additional information or the feature amount is updated or recording is completed. If determining that recording is completed, the system controller 20 terminates the process shown in this flow chart.

[0055]

Practical examples of the aforementioned additional information and feature amount and detailed contents of the representative frame detecting process using these examples will be explained below.

[0056]

Representative frame detecting process using additional information

The additional information detected by the additional information detecting circuit 16 contains, e.g., the genre of a program, the time period of broadcasting, and the channel of broadcasting.

[0057]

As the first representative frame detecting process using the additional information, the system controller 20 performs processing using genre information of a program, i.e., information of the

broadcast contents of a program. As shown in Fig. 3, the system controller 20 detects a representative frame by making the thinning ratio when a broadcast program is a news program different from that in other cases. That is, the system controller 20 records a news program by raising the thinning ratio. This is so because a news program has many explanations using sounds and telops, and therefore its contents are readily understandable even when the thinning ratio is raised. Accordingly, the system controller 20 checks the contents of a broadcast program on the basis of the additional information and, if the program has many explanations using sounds and telops like a news program, detects a representative frame by raising the thinning ratio compared to that for other programs.

[0058]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of a program by detecting a representative frame by changing the intermittence interval in accordance with each program. Therefore, the contents of the recorded video signal can be efficiently understood.

[0059]

As the second representative frame detecting process using the additional information, the system controller 20 performs processing using information of

the time period of broadcasting. As shown in Fig. 4, the system controller 20 detects a representative frame by making the thinning ratio for a program, which is broadcast in a time period called prime time during which the rating is high, different from that in other cases. That is, the system controller 20 detects a representative frame by lowering the thinning ratio when recording a program to be broadcast in this prime time, compared to other time periods. Accordingly, the system controller 20 checks the time period of a program to be broadcast on the basis of the additional information and, if the program is to be broadcast in a time period such as prime time during which the rating is generally high, detects a representative frame by lowing the thinning ratio compared to other time periods.

[0060]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to each time period by detecting a representative frame by changing the intermittence interval in accordance with the time period of broadcasting. Therefore, the contents of the recorded video signal can be efficiently understood.

[0061]

As the third representative frame detecting process using the additional information, the system controller 20 performs processing using information of a

broadcasting channel. If a plurality of broadcasting channels are present, i.e., if a plurality of supply sources of broadcast video signals are present, e.g., if three channels A, B, and C are present as shown in Fig. 5, the system controller 20 detects a representative frame by changing the thinning ratio from one channel to another. For example, the system controller 20 detects a representative frame at a high thinning ratio when recording the channel B, detects a representative frame at an intermediate thinning ratio when recording the channel C, and detects a representative frame at a low thinning ratio when recording the channel A.

[0062]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to each broadcasting supply source by detecting a representative frame by changing the intermittence interval from one broadcasting supply source to another. Therefore, the contents of the recorded video signal can be efficiently understood.

[0063]

Representative frame detecting process when feature amount is used

Examples of the feature amount detected by the feature amount detecting circuit 17 are the moving amount of an image, i.e., a motion vector between images,

and telop information indicating a telop inserted into a frame.

[0064]

As the first representative frame detecting processing using the feature amount, the system controller 20 performs processing using the moving amount of an image detected by the feature amount detecting circuit 17. As shown in Fig. 6, the system controller 20 detects a representative frame at a low thinning ratio when a broadcast program is a sports program having a large moving amount, detects a representative frame at an intermediate thinning ratio when a broadcast program is, e.g., a drama or a movie, and detects a representative frame at a high thinning ratio when a broadcast program is, e.g., a news program. The moving amount of each program is determined by the average of the moving amounts of a plurality of frames, not by an instantaneous moving amount. The moving amount detecting method of the feature amount detecting circuit 17 is not particularly restricted. The moving amount can also be detected by using a moving amount added to a video signal.

[0065]

Detailed process contents of this first representative frame detecting process using the feature amount will be described below with reference to a flow chart shown in Fig. 7. This flow chart shown in Fig. 7

corresponds to the processing in step S6 of the process shown in Fig. 2 described above.

[0066]

In step S1 shown in Fig. 2, the system controller 20 loads predetermined threshold values A and B from the database 21. These threshold values are used to set the thinning ratio from the moving amount of a video signal. The threshold value A indicates the upper limit of the moving amount, and the threshold value B indicates the lower limit of the moving amount. Accordingly, the relationship between the threshold values A and B is threshold value A > threshold value B. In step S3 shown in Fig. 2, the system controller 20 reads out the moving amount of a video signal as the feature amount from the feature amount detecting circuit 17. This moving amount is not the moving amount of each frame but the average moving amount of a video signal obtained by calculating the average moving amount of a predetermined time such as 30 frames or several ten frames.

[0067]

First, in step S11, the system controller 20 compares the average moving amount of the video signal read out from the feature amount detecting circuit 17 with the threshold value A. If the average moving amount is larger than the threshold value A, the flow advances to step S12. In step S12, the system controller 20 sets the thinning ratio for a large moving amount, i.e., sets

the low thinning ratio, and the flow advances to step S16. If the average moving amount is smaller than the threshold value A in step S11, the flow advances to step S13.

[0068]

In step S13, the system controller 20 compares the average moving amount of the video signal read out from the feature amount detecting circuit 17 with the threshold value B. If the average moving amount is smaller than the threshold value B, the flow advances to step S14. In step S14, the system controller 20 sets the thinning ratio for an intermediate moving amount, i.e., sets the intermediate thinning ratio, and the flow advances to step S16. If the average moving amount is smaller than the threshold value B in step S13, the flow advances to step S15. In step S15, the system controller 20 sets the thinning ratio for a large moving amount, i.e., sets the high thinning ratio, and the flow advances to step S16.

[0069]

In step S16, the system controller 20 performs the representative frame detecting process. That is, the system controller 20 supplies a thinning control signal to the thinning circuit 18. Note that the video signal recording apparatus 1 can perform the process such that the system controller 20 supplies only intermittence interval information to the thinning circuit 18, and the

thinning circuit 18 independently determines a representative frame to be detected, or, the system controller 20 determines the frame position of a representative frame to be detected and supplies a detection control signal to the thinning circuit 18, and the thinning circuit 18 detects each representative frame on the basis of this control signal.

[0070]

When completing the representative frame detecting process in step S16, the system controller 20 terminates the process.

[0071]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of the movement of a program by detecting a representative frame by changing the intermittence interval in accordance with the moving amount. Therefore, the contents of the recorded video signal can be efficiently understood.

[0072]

As the second representative frame detecting process, the system controller 20 performs processing using telop information of an image detected by the feature amount detecting circuit 17. As shown in Fig. 8, the system controller 20 detects a representative frame at a high thinning ratio when a broadcast program is, e.g., a news program having a high telop appearance

frequency (a telop appearance frequency will be simply referred to as a telop amount hereinafter), detects a representative frame at an intermediate thinning ratio when a broadcast program is, e.g., a sports program, and detects a representative frame at a low thinning ratio when a broadcast program is, e.g., a drama or movie. The telop amount of each program is determined by an average telop amount within a predetermined time, not by an instantaneous telop amount. Examples of the method of detecting a telop in a frame performed by the feature amount detecting circuit 17 are a method of detecting pixels continuously having a predetermined luminance in the time base direction, a method of detecting a region in which the luminance level is higher than in nearby pixels, a method of detecting the edge in a frame and detecting a predetermined region where the edge pattern continues, and a method using a histogram by comparison with the contrast to the background. However, the method is not particularly limited. A telop can also be detected using a telop amount added to a video signal.

[0073]

Detailed process contents of this second representative frame detecting process using the feature amount will be described below with reference to a flow chart shown in Fig. 9. This flow chart shown in Fig. 9 corresponds to the processing in step S6 of the process shown in Fig. 2 described previously.

[0074]

In step S1 shown in Fig. 2, the system controller 20 loads predetermined threshold values C and D from the database 21. These threshold values are used to determine the thinning amount of a video signal. The threshold value C indicates the upper limit of the telop amount, and the threshold value D indicates the lower limit of the telop amount. Accordingly, the relationship between the threshold values C and D is threshold value C > threshold value D. In step S3 shown in Fig. 2, the system controller 20 reads out the telop amount of a video signal as the feature amount from the feature amount detecting circuit 17. This telop amount is not the telop amount of each frame but the average telop amount of a video signal obtained by calculating the average telop amount of a predetermined time such as one minute or several ten minutes.

[0075]

First, in step S21, the system controller 20 compares the average telop amount of the video signal read out from the feature amount detecting circuit 17 with the threshold value C. If the average telop amount is larger than the threshold value C, the flow advances to step S22. In step S22, the system controller 20 sets the thinning ratio for a large telop amount, i.e., sets the high thinning ratio, and the flow advances to step S26. If the average telop amount is smaller than the

threshold value C in step S21, the flow advances to step S23.

[0076]

In step S23, the system controller 20 compares the average telop amount of the video signal read out from the feature amount detecting circuit 17 with the threshold value D. If the average telop amount is larger than the threshold value D, the flow advances to step S24. In step S24, the system controller 20 sets the thinning ratio for an intermediate telop amount, i.e., sets the intermediate thinning ratio, and the flow advances to step S26. If the average telop amount is smaller than the threshold value D in step S23, the flow advances to step S25. In step S25, the system controller 20 sets the thinning ratio for a small telop amount, i.e., sets the low thinning ratio, and the flow advances to step S26.

[0077]

In step S26, the system controller 20 performs the representative frame detecting process. That is, the system controller 20 supplies a thinning control signal to the thinning circuit 18. Note that the video signal recording apparatus 1 can perform the process such that the system controller 20 supplies only intermittence interval information to the thinning circuit 18, and the thinning circuit 18 independently determines a representative frame to be detected, or, the system

controller 20 determines the frame position of a representative frame to be detected and supplies a detection control signal to the thinning circuit 18, and the thinning circuit 18 detects each representative frame on the basis of this control signal.

[0078]

When completing the representative frame detecting process in step S26, the system controller 20 terminates the process.

[0079]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of the telop of a program by detecting a representative frame by changing the intermittence interval in accordance with the telop amount. Therefore, the contents of the recorded video signal can be efficiently understood.

[0080]

As the third representative frame detecting process using the feature amount, the system controller 20 detects a so-called cut point as a switching point between scenes by using the moving amount of an image detected by the feature amount detecting circuit 17. Fig. 10 is a view showing details of this third representative frame detecting process using the feature amount, by using scenes of a sports program (a soccer program in this example). As shown in Fig. 10, the

system controller 20 detects a frame at a point at which a kick scene at time t_1 switches to a ball scene, as a representative frame. Also, the system controller 20 detects a point at which a ball scene at time t_2 switches to a heading scene, as a representative frame.

[0081]

More specifically, to detect this cut point, the system controller 20 compares the moving amount between detected images with a predetermined threshold value, and detects a representative frame when the moving amount exceeds this predetermined threshold value.

[0082]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of an image by detecting a cut point of the video signal and using the detected cut point as a representative frame. Therefore, the contents of the recorded video signal can be efficiently understood.

[0083]

As the fourth representative frame detecting process using the feature amount, the system controller 20 detects as a representative frame a so-called cut point which is a switching point between scenes, and also detects representative frames at predetermined intervals from an image in which scenes switch little, by using the moving amount of an image detected by the

feature amount detecting circuit 17. Fig. 11 is a view showing details of this fourth representative frame detecting process using the feature amount, by using scenes of a sports program (a soccer program in this example). As shown in Fig. 11, the system controller 20 detects a frame at a point at which a kick scene at time t_4 switches to a ball scene, as a representative frame. Also, the system controller 20 detects a point at which a ball scene at time t_7 switches to a heading scene, as a representative frame. In addition to detecting these cut points, the system controller 20 detects this cut point and representative frames at predetermined intervals, as indicated by times t_3, t_5, and t_6.

[0084]

More specifically, to perform this detection, the system controller 20 compares the moving amount between detected images with a predetermined threshold value, detects a representative frame when the moving amount exceeds this predetermined threshold value, and also changes the thinning ratio by increasing or decreasing the threshold value.

[0085]

The contents of the fourth representative frame detecting process using the feature amount will be described below with reference to a flow chart shown in Fig. 12. This flow chart shown in Fig. 12 corresponds to the processing in step S6 of the process shown in Fig. 2

described previously.

[0086]

In step S1 shown in Fig. 2, the system controller 20 loads a predetermined threshold value E from the database 21. This threshold value E is set beforehand. In step S3 shown in Fig. 2, the system controller 20 reads out the moving amount of a video signal as the feature amount from the feature amount detecting circuit 17. This moving amount is, e.g., the moving amount of each frame.

[0087]

First, in step S31, the system controller 20 compares the moving amount of the video signal read out from the feature amount detecting circuit 17 with the threshold value E. If the moving amount is smaller than the threshold value E, the flow advances to step S32. In step S32, the system controller 20 subtracts a predetermined value from this threshold value E, and terminates the process. If the moving amount is larger than the threshold value E in step S31, the flow advances to step S33.

[0088]

In step S33, the system controller 20 performs the representative frame detecting process. That is, the system controller 20 supplies a thinning control signal to the thinning circuit 18. Note that the system controller 20 determines the frame position of a

representative frame to be detected and supplies a detection control signal to the thinning circuit 18, and the thinning circuit 18 detects each representative frame on the basis of this control signal. When the representative frame detecting process is completed in step S33, the flow advances to step S34.

[0089]

In step S34, the system controller 20 adds a predetermined value to this threshold value E and terminates the process.

[0090]

When the processing in this step S34 is completed, the audio transmitting unit 10 starts the process of checking whether the additional information and the feature amount are updated in step S8 shown in Fig. 2. In this fourth representative frame detecting process using the feature amount, however, the processing in this step S8 is not performed, and whether the operation in step S9 is completed is checked. If the operation is not completed, the processing from step S3 is repeated.

[0091]

The relationship between the subtraction value as a constant used to subtract a predetermined amount from the threshold value E in step S32 and the addition value as a constant used to add a predetermined amount to the threshold value E in step S34 will be described below. As described above, the threshold value E is a value to

be compared with the moving amount of each temporally continuous frame forming a moving image. The system controller 20 compares the moving amount with the threshold value E, and changes this threshold value E in accordance with the comparison result. That is, the change amount of the threshold value E is determined by the addition value added when a representative frame is determined, and by the subtraction value subtracted when no representative frame is detected. These addition value and subtraction value determine the detection amount of a representative frame with respect to an input moving image. For example, if the ratio of the addition value to the subtraction value is 1 to 100, one representative frame is detected from 100 input moving images. If the absolute amounts of the addition value and subtraction value as the change amounts of this threshold value E increase, the detection sensitivity also increases, so representative frames can be detected averagely. If the change amount is small, the detection of representative frames varies in accordance with the detection amount of the difference.

[0092]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of an image by detecting a cut point of a video signal and detecting representative frames at predetermined intervals if scenes switch

little. Therefore, the contents of the recorded video signal can be efficiently understood.

[0093]

Representative frame detecting process using both additional information and feature amount

As the first representative frame detecting process using both the additional information and the feature amount, the system controller 20 performs processing using genre information detected by the additional information detecting circuit 16 and telop information of an image detected by the feature amount detecting circuit 17. As shown in Fig. 13(a), the system controller 20 performs a representative frame detecting process which preferentially detects a telop image at a high thinning ratio when a broadcast program is, e.g., a news program having many telop images, performs a representative frame detecting process which preferentially detects a telop image at a low thinning ratio when a broadcast program is, e.g., a sports program, and performs a representative frame detecting process which preferentially detects a telop image at an intermediate thinning ratio when a broadcast program is, e.g., a drama or movie.

[0094]

In this representative frame detection giving priority to a telop image, as shown in Fig. 13(b), representative frames are detected at equal intervals,

and whether a telop image exists near each detected representative frame is checked. If a telop image exists near a representative frame, this representative frame is preferentially detected. In this detection, the system controller 20 must detect a telop by using an instantaneous telop amount. That is, the system controller 20 must acquire the existence of a telop in each frame from the feature amount detecting circuit 17.

[0095]

Detailed process contents of this first representative frame detecting process using both the additional information and the feature amount will be described below with reference to a flow chart shown in Fig. 14. This flow chart shown in Fig. 14 corresponds to the processing in step S6 of the process shown in Fig. 2 described earlier.

[0096]

In step S3 shown in Fig. 2, the system controller 20 reads out telop information of a video signal as the feature amount from the feature amount detecting circuit 17. Also, in this step S3, the system controller 20 loads genre information as the additional information from the additional information detecting circuit 16. This telop information indicates whether a telop exists in each frame.

[0097]

First, in step S41, the system controller 20 sets

a telop flag for each frame having a telop, on the basis of the telop information read out from the additional information detecting circuit 16.

[0098]

Subsequently, in step S42, the system controller 20 checks by the genre information whether the broadcast program is a sports program. If the system controller 20 determines in step S42 that the broadcast program is a sports program, the system controller 20 sets the low thinning ratio in step S43, and the flow advances to step S47. If the system controller 20 determines in step S42 that the broadcast program is not a sports program, the flow advances to step S44.

[0099]

In step S44, the system controller 20 checks by the genre information whether the broadcast program is a news program. If the system controller 20 determines in step S44 that the broadcast program is a news program, the system controller 20 sets the high thinning ratio in step S45, and the flow advances to step S47. If the system controller 20 determines in step S44 that the broadcast program is not a news program, the system controller 20 sets the intermediate thinning ratio in step S46, and the flow advances to step S47.

[0100]

In step S47, the system controller 20 performs the representative frame detecting process. That is, the

system controller 20 supplies a thinning control signal to the thinning circuit 18.

[0101]

In step S48, the system controller 20 checks whether a telop flag is present near the detected representative frames. If the system controller 20 determines that there is a frame having a set telop flag nearby, the flow advances to step S49, and the system controller 20 changes the representative frame set in step S47 to the frame having a set telop flag, and terminates the process. If determining that there is no frame having a set telop flag nearby, the system controller 20 immediately terminates the process.

[0102]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of an image by detecting a representative frame by using the additional information and the feature amount such as genre information and telop information. Therefore, the contents of the recorded video signal can be understood more efficiently.

[0103]

As the second representative frame detecting process using the additional information and the feature amount, the system controller 20 performs processing using information of a broadcasting time period detected by the additional information detecting circuit 16 and

the moving amount of an image detected by the feature amount detecting circuit 17. As shown in Fig. 15, when the time period of a broadcast program is so-called prime time, the system controller 20 detects a representative frame by using the above-mentioned fourth representative frame detecting process (to be referred to as a frame sampling representative frame detecting process hereinafter) which uses the feature amount. When the time period of a broadcast program is other than prime time, the system controller 20 detects a representative frame by using the aforementioned third representative frame detecting process (to be referred to as a cut point representative frame detecting process hereinafter) which uses the feature amount.

[0104]

Detailed process contents of this second representative frame detecting process using both the additional information and the feature amount will be described below with reference to a flow chart shown in Fig. 16. This flow chart shown in Fig. 16 corresponds to the processing in step S6 of the process shown in Fig. 2.

[0105]

In step S1 shown in Fig. 2, the system controller loads a predetermined threshold value from the database 21. In step S3 shown in Fig. 2, the system controller 20 reads out the moving amount of a video signal as the feature amount from the feature amount detecting circuit

17. Also, in this step S3, the system controller 20 loads information of the broadcasting time period of a program as the additional information from the additional information detecting circuit 16.

[0106]

In step S51, the system controller 20 checks whether the broadcast program is a prime-time program, on the basis of the information of the broadcasting time period. If determining that the broadcast program is a prime-time program, in step S52 the system controller 20 performs the frame sampling detecting process shown in the flow chart of Fig. 12 described above, and terminates the process.

[0107]

If determining that the broadcast program is not a prime-time program, in step S53 the system controller 20 compares the predetermined threshold value with the moving amount to detect a cut point as a representative frame.

[0108]

As this second representative frame detecting process using the additional information and the feature amount, the cut point representative frame detecting process and the frame sampling representative frame detecting process are switched in accordance with a broadcasting time period. However, the cut point representative frame detecting process and the frame

sampling representative frame detecting process can also be switched in accordance with other factor than a broadcasting time period. For example, the switching can be performed such that the frame sampling representative frame detecting process is performed when the thinning interval is 1 frame/5 sec or more, and the cut point representative frame detecting process is performed when the thinning interval is 1 frame/5 sec or less.

[0109]

As described above, the video signal recording apparatus 1 can intermittently record a video signal suited to the contents of an image by detecting a representative frame by selectively using, where necessary, a plurality of representative frame detecting processes using the additional information and the feature amount, on the basis of manipulation input or the like. Therefore, the contents of the recorded video signal can be understood more efficiently.

[0110]

As described above, the video signal recording apparatus 1 intermittently records a video signal by using the additional information and the feature amount, so the contents of the recorded video signal can be readily understood. In addition, since a representative frame is efficiently selected in accordance with the contents of an image, an effective intermittent image by which an outline of the recorded image can be understood

can be generated within a short time period.

[0111]

Next, a learning process using the database 21 of the video signal recording apparatus 1 will be described below.

[0112]

The system controller 20 stores, on the database 21 for a predetermined period, the additional information and feature amount information described above and information such as additional information which the user inputs by using the manipulation input circuit 22. On the basis of these pieces of information, the system controller 20 performs statistical processing and the like, and sets the thinning ratio.

[0113]

For example, as shown in Fig. 17, the database 21 has a table of the frequency distribution of the thinning ratios of broadcasting time periods. If nothing is designated by manipulation input or the like, the system controller 20 selects a thinning ratio having the highest frequency by referring to this frequency distribution, and detects a representative frame.

[0114]

Detailed process contents of detection using this learning process will be described below with reference to a flow chart shown in Fig. 18. This flow chart shown in Fig. 18 corresponds to the processing in step S4 of

the process shown in Fig. 2 described previously.

[0115]

In step S1 shown in Fig. 2, the system controller 20 loads the above-mentioned past thinning ratio frequency distribution from the database 21. In step S3 shown in Fig. 2, the system controller 20 reads out the additional information from the additional information detecting circuit 16 and the feature amount from the feature amount detecting circuit 17.

[0116]

First, in step S61, the system controller 20 checks whether the user sets a thinning ratio or designates a method of setting each thinning ratio. If there is a designation from the user, the flow advances to step S62, and the system controller 20 designates a thinning ratio on the basis of the manipulation input. That is, from this step S62 the system controller 20 performs the practical thinning ratio setting process described above, detecting a representative frame. If there is no designation from the user in step S61, the flow advances to step S63.

[0117]

In step S63, the system controller 20 checks whether data of the frequency distribution indicating information of the thinning ratio is present on the database 21. If the system controller 20 determines that there is no data of the frequency distribution on the

database 21, the flow advances to step S64. In this step S64, the system controller 20 sets the thinning ratio to an initial value, e.g., sets the intermediate thinning ratio, and terminates the process. If the system controller 20 determines that there is data of the frequency distribution on the database 21, the flow advances to step S65.

[0118]

In step S65, the system controller 20 adds the preloaded additional information and the like to the frequency distribution on the database 21.

[0119]

Subsequently, in step S66 the system controller 20 performs statistical processing. In step S67, the system controller 20 sets the thinning ratio on the basis of this statistical processing.

[0120]

As described above, the video signal recording apparatus 1 can set a preferred thinning ratio by storing the thinning ratios of predetermined periods in the database 21 and setting the thinning ratio on the basis of this information stored in the database 21.

[0121]

An identification signal supplied from the system controller 20 to the recording circuit 14 of the video signal recording apparatus 1 will be described below.

[0122]

The system controller 20 obtains a thinning ratio and a representative frame to be detected as described above, and controls the thinning circuit 18 on the basis of the thinning ratio and the like. In addition, the system controller 20 supplies an identification signal to the recording circuit 14 in accordance with the thinning ratio and the like. The recording circuit 14 records this identification signal, together with a video signal, as a subcode and ID code of the video signal.

[0123]

For example, when a video signal is to be recorded on an optical disk, as shown in Table 1 below, a subcode is recorded in units of sectors as minimum recording units. In reproduction, an intermittent video signal is reproduced on the basis of this subcode.

[0124]

[Table 1]

Subcode

Sector Number	4 Byte
Time Code	4 Byte
ID Code	1 Byte

ID Code

00	No identification signal
01	Representative frame detection signal
10	Identification signal A
11	Identification signal B

[0125]

As described above, the video signal recording apparatus 1 can record a normal video signal on the recording medium 15, and can also record intermittent reproduction information in this video signal by adding an identification signal to the video signal. That is, it is unnecessary to record two types of video signals, i.e., a normal video signal and an intermittent video signal, on the recording medium 15, so the recording medium 15 can be efficiently used. Accordingly, the video signal recording apparatus 1 can record a video signal which can be intermittently reproduced and can also be normally reproduced in the reproduction mode.

[0126]

[Effects of the Invention]

The video signal recording apparatus according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with additional information. By reproducing this intermittent image, a video signal corresponding to the contents of the additional information can be efficiently understood.

[0127]

The video signal recording apparatus according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with a feature amount. By reproducing this intermittent image, a video signal corresponding to the contents of the feature amount can be efficiently understood.

[0128]

The video signal recording apparatus according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with additional information and a feature amount. By reproducing this intermittent image, a video signal corresponding to the contents of the additional information and feature amount can be efficiently

understood.

[0129]

The video signal recording method according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with additional information. By reproducing this intermittent image, a video signal corresponding to the contents of the additional information can be efficiently understood.

[0130]

The video signal recording method according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with a feature amount. By reproducing this intermittent image, a video signal corresponding to the contents of the feature amount can be efficiently understood.

[0131]

The video signal recording method according to the present invention can generate an intermittent image by which an outline of recorded contents can be understood, by recording an intermittent video signal by detecting a representative frame in accordance with additional information and a feature amount. By reproducing this intermittent image, a video signal corresponding to the

contents of the additional information and feature amount can be efficiently understood.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a block diagram showing a video signal recording apparatus according to an embodiment of the present invention.

[Fig. 2]

Fig. 2 is a flow chart showing the contents of processing of a system controller of the above video signal recording apparatus;

[Fig. 3]

Fig. 3 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 4]

Fig. 4 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 5]

Fig. 5 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 6]

Fig. 6 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 7]

Fig. 7 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus;

[Fig. 8]

Fig. 8 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 9]

Fig. 9 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus;

[Fig. 10]

Fig. 10 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 11]

Fig. 11 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 12]

Fig. 12 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus;

[Fig. 13]

Fig. 13 is a view for explaining the thinning ratio of a representative frame detected by the above video signal

recording apparatus.

[Fig. 14]

Fig. 14 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus;

[Fig. 15]

Fig. 15 is a view for explaining the thinning ratio of a representative frame detected by the above video signal recording apparatus.

[Fig. 16]

Fig. 2 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus;

[Fig. 17]

Fig. 17 is a view for explaining the frequency distribution of thinning ratios stored in a database 21 of the above video signal recording apparatus.

[Fig. 18]

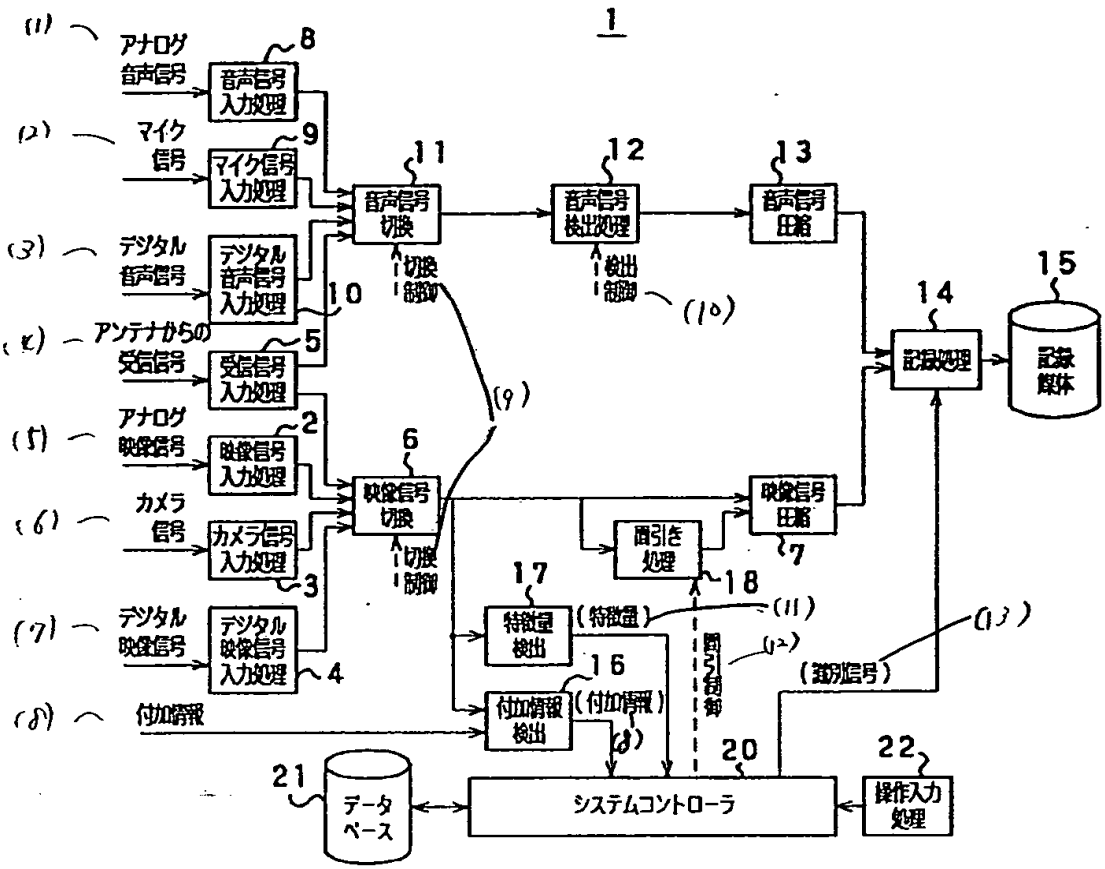
Fig. 18 is a flow chart showing the contents of processing of the system controller of the above video signal recording apparatus.

[Description of the Reference Numerals]

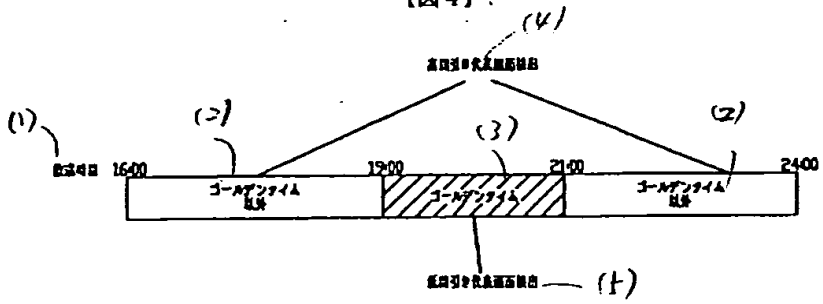
1	video signal recording apparatus
2	video signal input circuit
3	camera signal input circuit
4	digital video signal input circuit
5	received signal input circuit

7	video signal compressing circuit
14	recording circuit
15	recording medium
16	additional information detecting circuit
17	feature amount detecting circuit
18	thinning circuit
20	system controller
21	database
22	manipulation input circuit

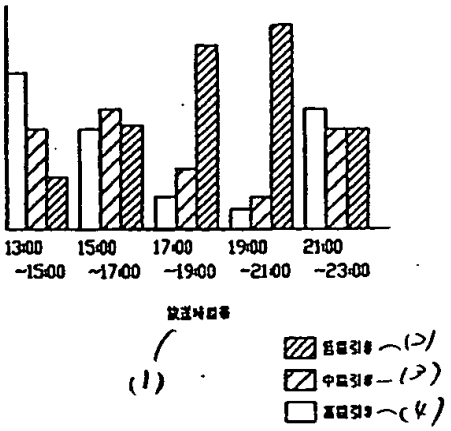
【図1】 [FIG.1]



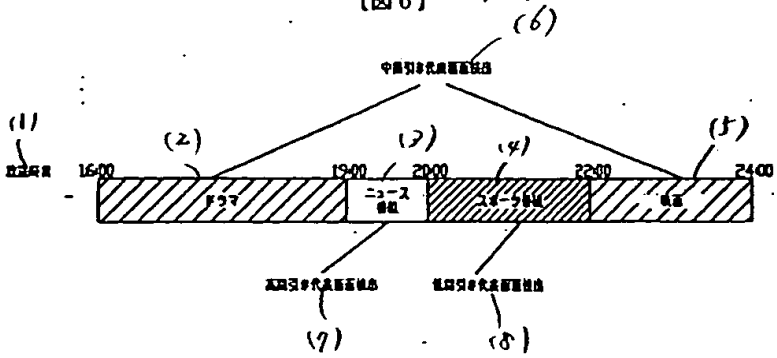
【図4】 [FIG.4]



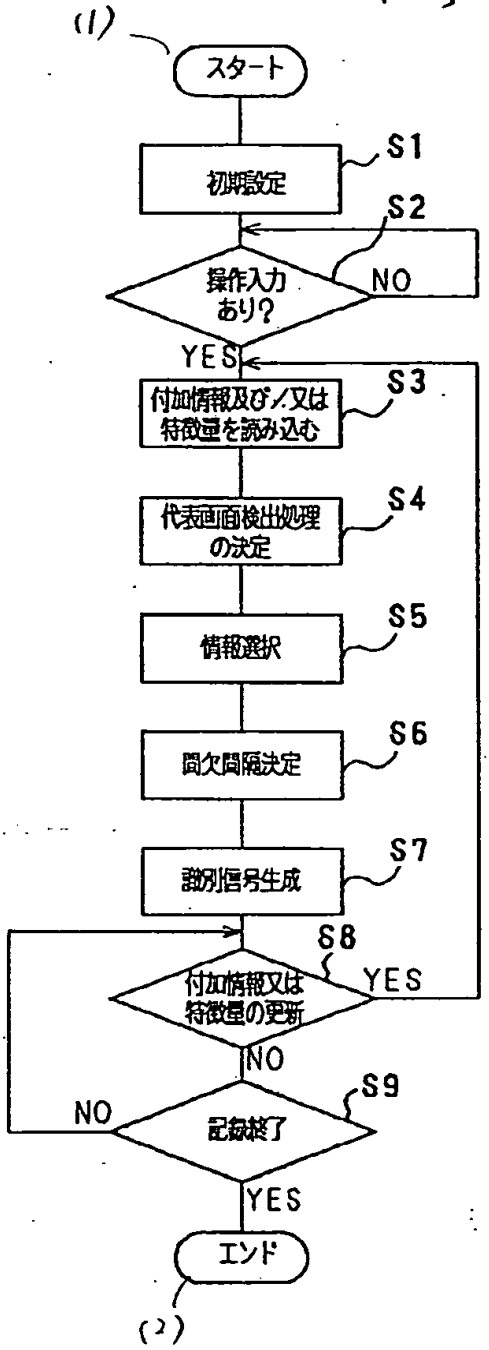
【図17】 [FIG.17]



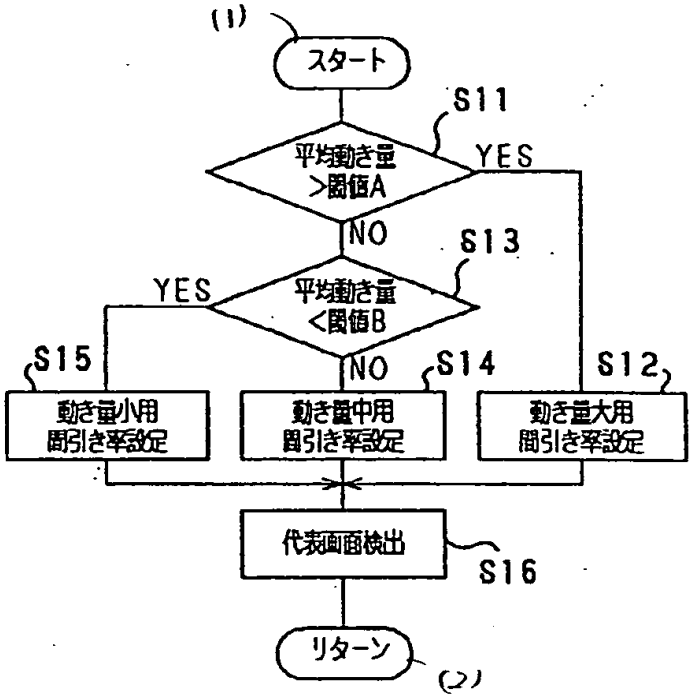
【図6】 [FIG.6]



【図2】 [FIG. 2]

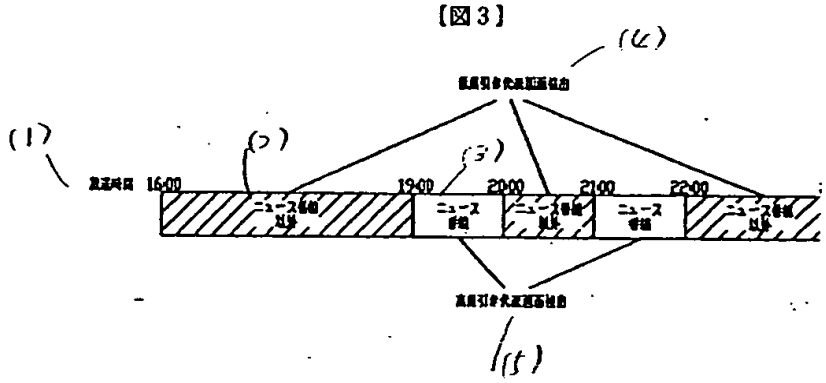


【図7】 [FIG. 7]



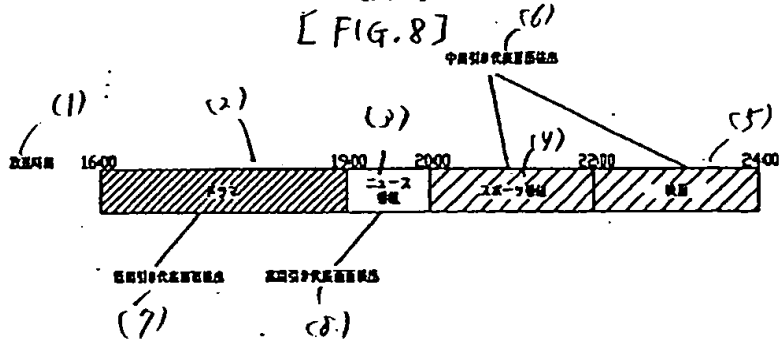
[FIG. 3]

【図3】

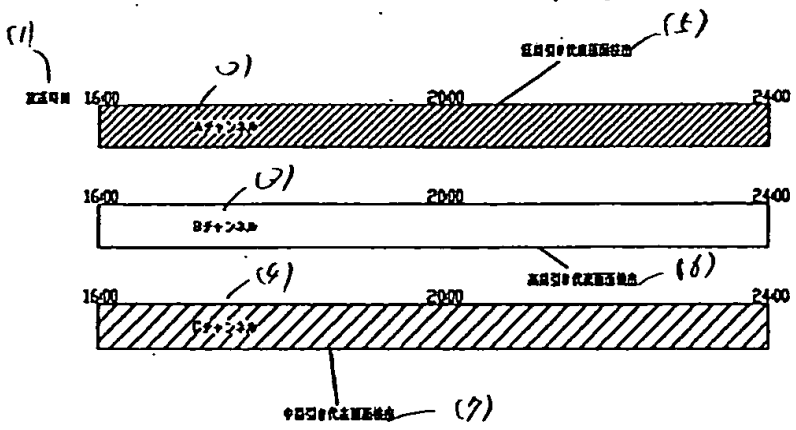


【図8】

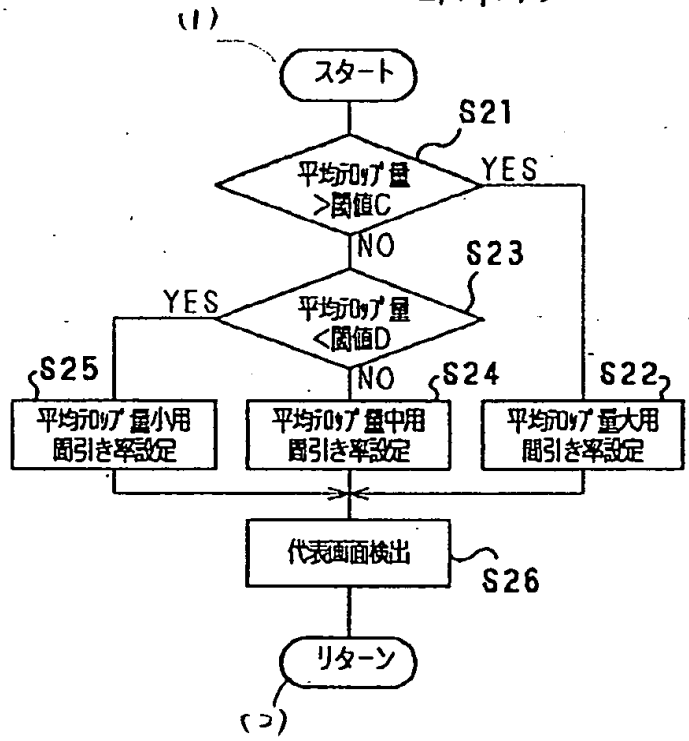
[FIG. 8]



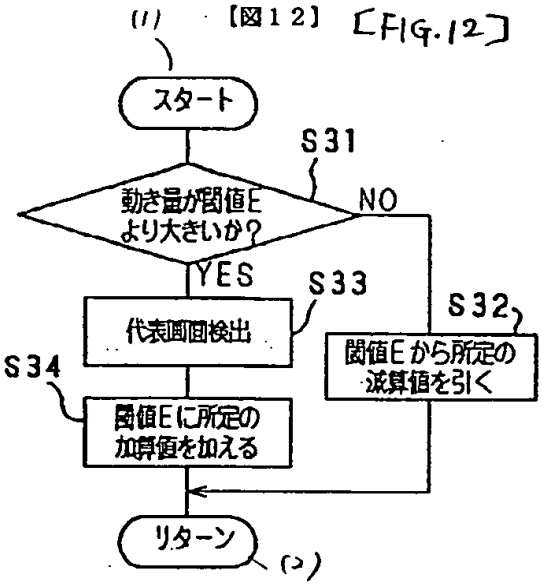
【図5】 [FIG.5]



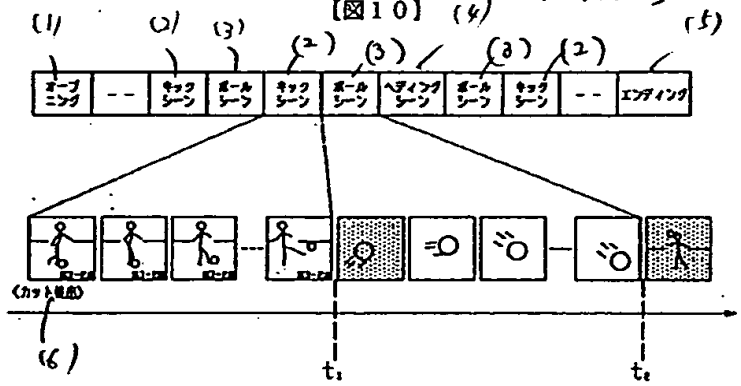
【図9】 [FIG.9]



【図12】 [FIG.12]

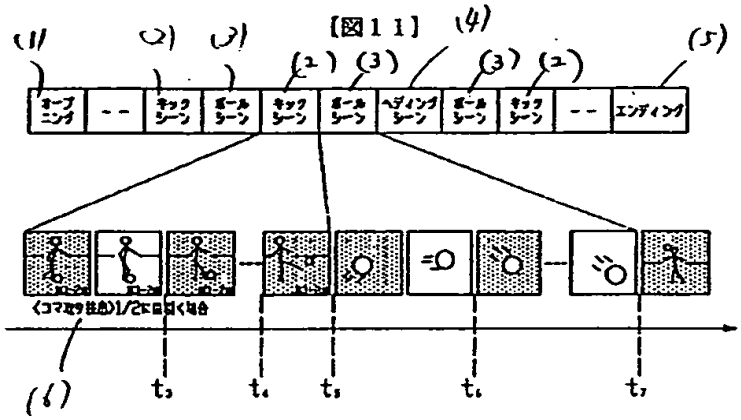


【図10】 [FIG.10]

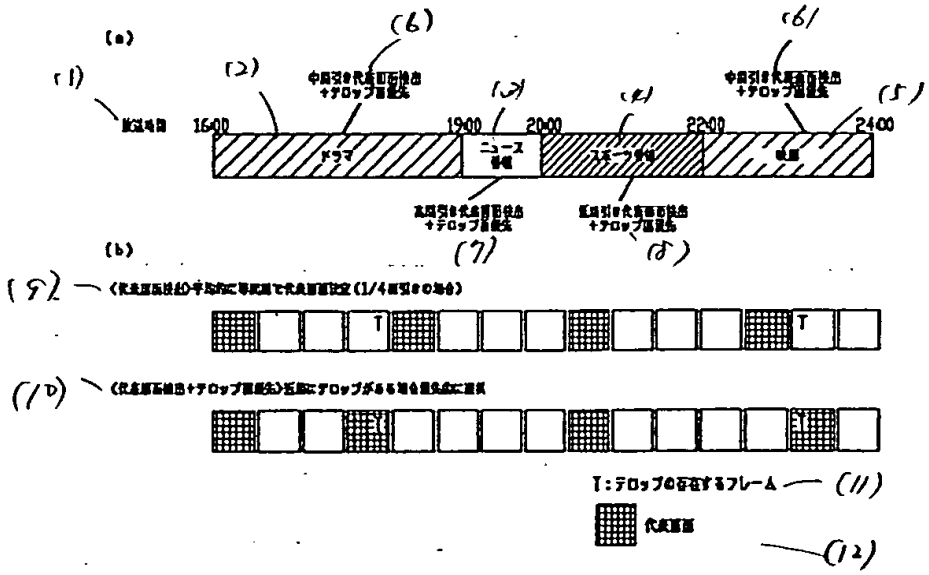


[FIG.11]

【図１１】

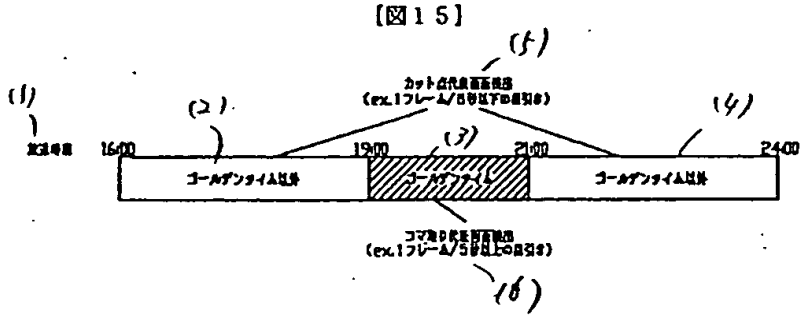


【図１３】　[FIG.13]



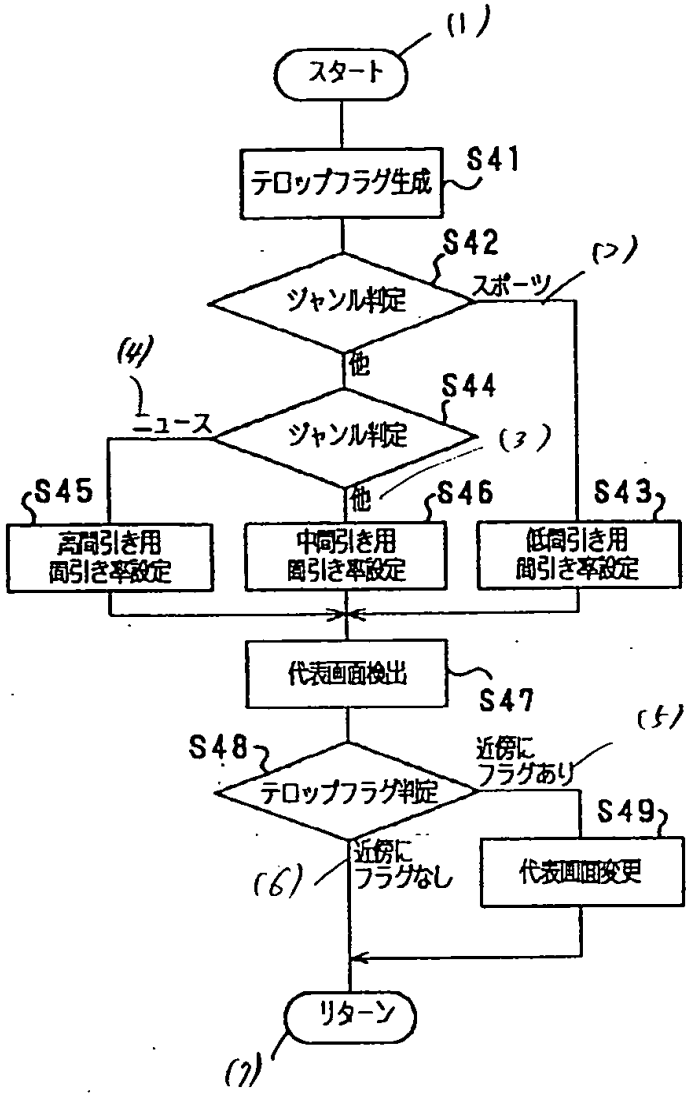
[FIG.15]

【図１５】

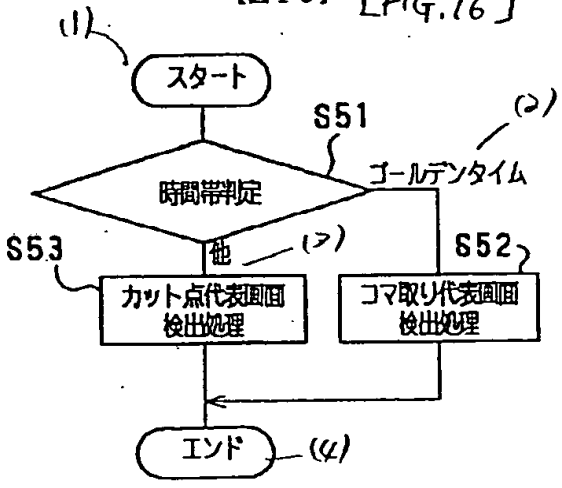


[FIG.14]

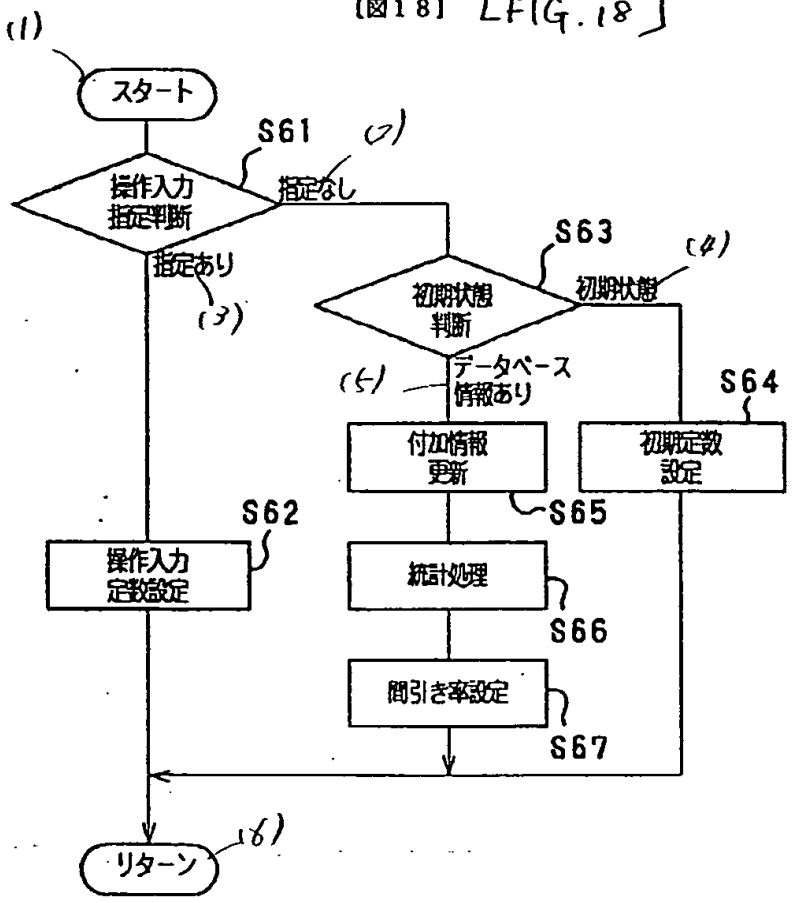
【図１４】



【図１６】 [FIG.16]



【図18】 [FIG. 18]



フロントページの続き

(72)発明者 秋葉 俊哉
東京都品川区北品川6丁目7番35号 ソニー株式会社内

(72)発明者 村林 昇
東京都品川区北品川6丁目7番35号 ソニー株式会社内

(72)発明者 冨田 真巳
東京都品川区北品川6丁目7番35号 ソニー株式会社内

(72)発明者 水藤 太郎
東京都品川区北品川6丁目7番35号 ソニー株式会社内

FIG. 1

2	VIDEO SIGNAL INPUT CIRCUIT
3	CAMERA SIGNAL INPUT CIRCUIT
4	DIGITAL VIDEO SIGNAL INPUT CIRCUIT
5	RECEIVED SIGNAL INPUT CIRCUIT
6	VIDEO SIGNAL SWITCHING CIRCUIT
7	VIDEO SIGNAL COMPRESSING CIRCUIT
8	AUDIO SIGNAL INPUT CIRCUIT
9	MICROPHONE SIGNAL INPUT CIRCUIT
10	DIGITAL AUDIO SIGNAL INPUT CIRCUIT
11	AUDIO SIGNAL SWITCHING CIRCUIT
12	AUDIO SIGNAL DETECTING CIRCUIT
13	AUDIO SIGNAL COMPRESSING CIRCUIT
14	RECORDING CIRCUIT
15	RECORDING MEDIUM
16	ADDITIONAL INFORMATION DETECTING CIRCUIT
17	FEATURE AMOUNT DETECTING CIRCUIT
18	THINNING CIRCUIT
20	SYSTEM CONTROLLER
21	DATABASE
22	MANIPULATION INPUT CIRCUIT
(1)	ANALOG AUDIO SIGNAL
(2)	MICROPHONE SIGNAL
(3)	DIGITAL AUDIO SIGNAL
(4)	RECEIVED SIGNAL FROM ANTENNA
(5)	ANALOG VIDEO SIGNAL
(6)	CAMERA SIGNAL

(7) DIGITAL VIDEO SIGNAL

(8) ADDITIONAL INFORMATION

(9) SWITCHING CONTROL

(10) DETECTION CONTROL

(11) FEATURE AMOUNT

(12) THINNING CONTROL

(13) IDENTIFICATION SIGNAL

FIG. 2

(1) START

S1 INITIALIZATION

S2 MANIPULATION INPUT?

S3 LOAD ADDITIONAL INFORMATION AND/OR FEATURE AMOUNT

S4 DETERMINE REPRESENTATIVE FRAME DETECTING PROCESS

S5 SELECT INFORMATION

S6 DETERMINE INTERMITTENCE INTERVAL

S7 GENERATE IDENTIFICATION SIGNAL

S8 ADDITIONAL INFORMATION OR FEATURE AMOUNT UPDATED?

S9 RECORDING COMPLETED?

(2) END

FIG. 3

(1) BROADCASTING TIME

(2) OTHER THAN NEWS PROGRAM

(3) NEWS PROGRAM

(4) LOW-THINNING REPRESENTATIVE FRAME DETECTION

(5) HIGH-THINNING REPRESENTATIVE FRAME DETECTION

FIG. 4

(1) BROADCASTING TIME

(2) OTHER THAN PRIME TIME

(3) PRIME TIME

(4) HIGH-THINNING REPRESENTATIVE FRAME DETECTION

(5) LOW-THINNING REPRESENTATIVE FRAME DETECTION

FIG. 5

(1) BROADCASTING TIME

(2) CHANNEL A

(3) CHANNEL B

(4) CHANNEL C

(5) LOW-THINNING REPRESENTATIVE FRAME DETECTION

(6) HIGH-THINNING REPRESENTATIVE FRAME DETECTION

(7) INTERMEDIATE-THINNING REPRESENTATIVE FRAME DETECTION

FIG. 6

(1) BROADCASTING TIME

(2) DRAMA

(3) NEWS PROGRAM

(4) SPORTS PROGRAM

(5) MOVIE

(6) INTERMEDIATE-THINNING REPRESENTATIVE FRAME DETECTION

(7) HIGH-THINNING REPRESENTATIVE FRAME DETECTION

(8) LOW-THINNING REPRESENTATIVE FRAME DETECTION

FIG. 7

(1) START

S11 AVERAGE MOVING AMOUNT > THRESHOLD VALUE A?

S12 SET THINNING RATIO FOR LARGE MOVING AMOUNT

S13 AVERAGE MOVING AMOUNT < THRESHOLD VALUE B?

S14 SET THINNING RATIO FOR INTERMEDIATE MOVING AMOUNT

S15 SET THINNING RATIO FOR SMALL MOVING AMOUNT

S16 DETECT REPRESENTATIVE FRAME

(2) RETURN

FIG. 8

(1) BROADCASTING TIME

(2) DRAMA

(3) NEWS PROGRAM

(4) SPORTS PROGRAM

(5) MOVIE

(6) INTERMEDIATE-THINNING REPRESENTATIVE FRAME DETECTION

(7) LOW-THINNING REPRESENTATIVE FRAME DETECTION

(8) HIGH-THINNING REPRESENTATIVE FRAME DETECTION

FIG. 9

(1) START

S21 AVERAGE TELOP AMOUNT > THRESHOLD VALUE C?

S22 SET THINNING RATIO FOR LARGE TELOP AMOUNT

S23 AVERAGE TELOP AMOUNT < THRESHOLD VALUE D?

S24 SET THINNING RATIO FOR INTERMEDIATE TELOP AMOUNT

S25 SET THINNING RATIO FOR SMALL TELOP AMOUNT

S26 DETECT REPRESENTATIVE FRAME

(2) RETURN

FIG. 10

(1) OPENING

(2) KICK SCENE

(3) BALL SCENE

(4) HEADING SCENE

(5) ENDING

(6) <CUT DETECTION>

FIG. 11

(1) OPENING

(2) KICK SCENE

(3) BALL SCENE

(4) HEADING SCENE

(5) ENDING

(6) <FRAME SAMPLING DETECTION> WHEN THINNED TO 1/2

FIG. 12

(1) START

S31 MOVING AMOUNT > THRESHOLD VALUE E?

S32 SUBTRACT PREDETERMINED SUBTRACTION VALUE FROM THRESHOLD VALUE E

S33 DETECT REPRESENTATIVE FRAME

S34 ADD PREDETERMINED ADDITION AMOUNT TO THRESHOLD VALUE E

(2) RETURN

FIGS. 13(a) & 13(b)

(1) BROADCASTING TIME

(2) DRAMA

(3) NEWS PROGRAM

(4) SPORTS PROGRAM

(5) MOVIE

(6) INTERMEDIATE-THINNING REPRESENTATIVE FRAME DETECTION + TELOP IMAGE PRIORITY

(7) HIGH-THINNING REPRESENTATIVE FRAME DETECTION + TELOP IMAGE PRIORITY

(8) LOW-THINNING REPRESENTATIVE FRAME DETECTION + TELOP IMAGE PRIORITY

(9) <REPRESENTATIVE FRAME DETECTION> DETERMINE REPRESENTATIVE FRAMES AVERAGELY AT EQUAL INTERVALS (IN CASE OF 1/4 THINNING)

(10) <REPRESENTATIVE FRAME DETECTION + TELOP IMAGE

PRIORITY> PREFERENTIALLY SELECT FRAME HAVING TELOP NEARBY

(11) T: FRAME HAVING TELOP

(12) REPRESENTATIVE FRAME

FIG. 14

(1) START

S41 GENERATE TELOP FLAG

S42 GENRE?

(2) SPORTS

(3) OTHERS

S43 SET THINNING RATIO FOR LOW THINNING

S44 GENRE?

(4) NEWS

S45 SET THINNING RATIO FOR HIGH THINNING

S46 SET THINNING RATIO FOR INTERMEDIATE THINNING

S47 DETECT REPRESENTATIVE FRAME

S48 TELOP FLAG?

(5) NEARBY FLAG

(6) NO NEARBY FLAG

S49 CHANGE REPRESENTATIVE FRAME

(7) RETURN

FIG. 15

(1) BROADCASTING TIME

(2) OTHER THAN PRIME TIME

(3) PRIME TIME

(4) OTHER THAN PRIME TIME

(5) CUT POINT REPRESENTATIVE FRAME DETECTION (EX. THINNING OF 1 FRAME/5 SEC OR LESS)

(6) FRAME SAMPLING REPRESENTATIVE FRAME DETECTION (EX. THINNING OF 1 FRAME/5 SEC OR MORE)

FIG. 16

(1) START

S51 TIME PERIOD?

(2) PRIME TIME

(3) OTHERS

S52 FRAME SAMPLING REPRESENTATIVE FRAME DETECTING PROCESS

S53 CUT POINT REPRESENTATIVE FRAME DETECTING PROCESS

(4) END

FIG. 17

(1) BROADCASTING TIME PERIOD

(2) LOW THINNING

(3) INTERMEDIATE THINNING

(4) HIGH THINNING

FIG. 18

(1) START

S61 DESIGNATED BY MANIPULATION INPUTTING?

(2) NOT DESIGNATED

(3) DESIGNATED

S62 SET CONSTANT BY MANIPULATION INPUT

S63 INITIAL STATE?

(4) INITIAL STATE

(5) INFORMATION IN DATABASE

S64 SET INITIAL CONSTANT

S65 UPDATE ADDITIONAL INFORMATION

S66 STATISTICAL PROCESSING

S67 SET THINNING RATIO

(6) RETURN